



Denver Water

Operations & Maintenance Division

Standard Operating Procedure

Subject : Valve Inspections

Item : Closed Boundary Valves (CBVs)

Date : September 1, 1999

Revision Date:

Purpose

- A. To establish guidelines for the inspection and operation of Closed Boundary Valves (CBVs) in the Denver Water distribution system. CBVs are maintained in order to delineate hydraulic pressure zones. A secondary purpose is to establish safety procedures which will provide adequate protection for workers and the public.

Policy

- A. It shall be the policy of Denver Water to conduct routine and systematic inspection of all CBVs in the water distribution system twice every year.
- B. It shall be the policy of Denver Water to maintain correct positioning of all CBVs in order to effectively operate the water distribution system.
- C. It shall be the policy of Denver Water that any necessary repairs found to be required are completed in a timely manner.

Equipment

- A. A vehicle equipped with overhead warning lights and traffic safety equipment is essential to provide protection in traffic lanes for workers and to clearly delineate the presence of an unusual situation for drivers and pedestrians.
- B. Field maps of the existing water distribution piping are required to assist workers in determining the correct valve at a given location.
- C. Workers must be provided with personal safety equipment i.e. hard hat, traffic safety vest, toe protection.
- D. Tools required include a valve box and manhole opening tool, tools for cleaning debris from valve boxes, a valve operating key and a leak listening device, such as, a sonophone.
- E. Light blue water-proof spray paint will be required to mark CBV valve box lids.
 - 1. Dark blue is designated as the color used to mark water facilities in the street by nation-wide utilities.
 - a. Light blue must not be used to mark any other facilities in the street except CBVs.
 - 2. This will clearly show which valves have been inspected and;
 - 3. Assist in locating valves in emergency situations.

Procedure

- A. Using maps and records from previous inspections, locate the correct valve in a given location. Items concerning the target valve that must be known before operating the valve include the following:
 1. What size is this valve?
 - a. It can be determined how many turns are required in order to operate from fully open to fully closed.
 - b. The formula is as follows; 3 times the diameter of the valve plus 3 equals total full turns. Of course this will be doubled for half turns.
 2. What size is the main?
 3. What direction is the valve operated?
 - a. In the Denver Water distribution system a standard valve is referred to as a Left Hand Valve (LHV). This is a valve that is turned from left to right in order to close the valve. Many districts do not utilize LHVs. Therefore it is imperative that the inspector know which way the valve operates. As one would reason, if the valve is not a LHV it must be a Right Hand Valve (RHV).
- B. Align vehicle in the street so as to cause minimal traffic interruption.
- C. Utilize all traffic safety equipment.
 1. Warning lights
 2. Traffic cones
 3. Flags
 4. Flagperson if necessary
- D. Remove valve box lid and or manhole cover.
- E. Visually inspect the box for proper alignment or obstructions.
- F. Clean obstructions from box.
- G. Use the valve key to determine if valve is closed as it should be.
 1. Having already determined which direction the valve normally operates, try turning the valve both directions.
 - a. The valve will present a stop at both full open or full closed. Leave the valve fully closed since it is a normally closed valve.
 - b. If the CBV is found open it should be slowly closed.
 2. An indicator as to whether the proper action has been taken in closing the valve is;
 - a. As the valve nears the closed position a noise and or vibration caused by water passing by the seats should become apparent. This indicates the pressure differential one would expect on a CBV.
 - b. If no noise is heard it may indicate that other valves in the vicinity may be closed and customer outages may result until all valve positions are verified.
- H. Operating variations in large valves used as a CBV operation;
 1. If the valve is an upright valve (dome of valve on top) and the key can be placed on an operating nut directly on top of the dome, the valve will operate in the direction indicated on the map.

2. Conversely, if there is a side gear that turns a second gear directly on top of the valve, the valve will turn opposite of map indication. This is common on older 16" valves in the Denver Water distribution system.
 - a. In both cases above, the valve is still considered to operate as shown on the map.
 3. If the large valve lies on it's side (dome on the side) and more than one gear is utilized, the valve will turn in the direction indicated on the map.
- I. Utilize a listening device to determine if there is a leak noise on the valve.
1. Since CBVs are closed valves, a leak may be heard if water is passing by the valve seats and gates.
 - a. This noise can be from water going over the gates, in which case the valve needs to be brought open slightly until leak noise stops.
 - b. Noise may be caused by water going under the gate, in which case the valve is not fully closed.
 1. It may be necessary to operate the valve up and down several times to obtain a good closure.
 - c. This noise may be caused by a packing leak.
 1. Packing leaks can often be stopped by operating the valve slightly to reposition the valve stem and packing.
 2. If the packing leak persists repairs should be completed in a timely manner.
- J. Remove debris from valve box lid and paint with light blue paint on both the inside and outside surfaces of the lid.
1. Paint inside will assure that the correct valve is located based on previous inspection marking.
 2. Paint outside will make locating valves much easier in the future.
- K. Move vehicle from the traffic lanes to a location where the worker can safely record all the information determined by the current inspection.
- L. Record the following information for future use:
1. Location of valve, for example; east property line (EPL)
 2. Size of valve
 3. Size of main
 4. Direction of operation
 5. Date of inspection
 6. Name of inspector
 7. Needed repairs
 8. Keep in mind that:
 - a. Previous inspections may have produced incorrect information.
 - b. Information on maps may be incorrect and every inspection is an opportunity to obtain accurate information.